

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



In re Patent Application of

Won-bong Choi et al.

Application No.: 10/601,872

Filed: June 24, 2003

For: CARBON NANOTUBES FOR FUEL  
CELLS, METHOD FOR  
MANUFACTURING THE SAME, AND  
FUEL CELL USING THE SAME

Group Art Unit: 1745

Examiner: DAH WEI D. YUAN

Confirmation No.: 1325

## DECLARATION BY INVENTOR UNDER 37 C.F.R. § 1.132

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

I, Chan-ho PAK, hereby state as follows:

1. I am a citizen of the Republic of Korea and an employee of Samsung Electronics Co., Ltd.
2. I am an inventor of the invention disclosed and claimed in the United States Patent Application No. 10/601,872, filed under 35 U.S.C. §111 on June 24, 2003, entitled "CARBON NANOTUBES FOR FUEL CELLS, METHOD FOR MANUFACTURING THE SAME, AND FUEL CELL USING THE SAME."
3. I have reviewed Dodelet et al. (U.S. Patent No. 6,887,451, hereinafter Dodelet), which is cited in the USPTO office communication dated January 30, 2007, in the above named U.S. Patent Application No. 10/601,872.
4. I am making this declaration for the purpose of traversing the 35 U.S.C. §102 and §103 rejections pending.
5. As discussed throughout the present application, and as previously provided in my Declaration executed on October 14, 2006, the branched carbon nanotubes as originally disclosed are in fact branched with (1) a branched carbon nanotube (CNT), (2) a main CNT, and (3) dispersed catalytic metal particles on the branched and main CNTs as illustrated in Figure 4.
6. It is necessary that reducing gas, such as H<sub>2</sub>, be supplied for an extended period of time (for example, about 10 min.) during the supply of carbon source gas in order

Declaration by Inventor under 37 C.F.R. § 1.132  
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to synthesize the branched CNT as claimed. For example, the branched CNT in Fig. 4 of the present invention is synthesized by supplying i) acetylene, ii) acetylene and hydrogen gas and iii) acetylene in this order (see the previous Declaration).

7. However, Dodelet maintains a constant  $\text{Ar} + \text{H}_2 + \text{C}_2\text{H}_2$  gas atmosphere during the entire length of the synthesis of CNT all the time (see Dodelet, column 3, lines 10-12). Dodelet uses Co and Ni as catalysts for growth of CNT. Co and Ni are easily oxidized and the oxidized Co and Ni cannot act as the catalysts for growth of the CNT. In order to prevent Co and Ni from being oxidized, Dodelet uses  $\text{Ar} + \text{C}_2\text{H}_2$  including  $\text{H}_2$  that creates a reduction atmosphere during the synthesis of CNT. Thus, the  $\text{H}_2$  in Dodelet cannot act as an etching agent, which exposes the catalyst so that the exposed catalyst can become nuclei from which the CNT branches can grow off from, as shown in the specification of the present invention. Therefore, the branched CNT cannot be synthesized by the method of Dodelet.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: 27 APRIL 2007

Changho Pak  
Changho PAK